arises from well-recognized and inflexible causes (environment, heredity, etc.). It is, therefore, a reality, not a closet creation. Herr Buchner has by no means destroyed it in his amusing attack on the great Berlin professor and his many books.

D. G. BRINTON.

UNIVERSITY OF PENNSYLVANIA.

NOTES ON INORGANIC CHEMISTRY.

THE use of coke ovens which permit the recovery of by-products has become established on the continent of Europe, and several plants have been established in this country. In the *Proceedings* of the Alabama Industrial and Scientific Society, Wm. H. Blauvelt gives a description of the Semet-Solvay oven at Ensley, Ala. The coal is coked in retort ovens, the usual change being 4½ tons. The time of coking is twenty-four hours. The amount of gas given off is eight to ten thousand cubic feet per ton, a part of which is used to heat the retort and for steam to operate the plant, leaving considerable gas available for heating and lighting purposes. The ammonia recovered is 16 to 22 pounds per ton, calculated as sulfate, and the yield of tar from 70 to 80 pounds. The yield of coke (75 per cent.) is ten per cent. higher than that obtained by the old beehive ovens. The cause of this is that the evolved gases, which are more or less completely burned in the beehive, are to some extent decomposed in the retort oven, graphitic carbon being deposited on the coke. In the beehive oven too some of the coke is consumed by the air present. The quality of the coke is pronounced equal to that produced in the old ovens, and some coals are available for coking which cannot be successfuly used with the beehive oven.

IN the *American Manufacturer*, W. B. Phillips gives the results of the Otto-Hoffman coke ovens at Jefferson Co., Ala. Here, using washed coal, the yield is: gas, 9,600 feet per ton, of which about 3,000 feet are available after all required on the plant; ammonium sulfate, 23.6 pounds; tar, 90 pounds; coke, 70 per cent. It is an encouraging sign to see the adoption in this country of industrial methods which have for their aim the saving of by-products.

IN an article on Aluminum as a reducing agent, in the *Chemiker Zeitung*, Léon Franck gives the following summary: Aluminum decomposes phosphates at high temperature, with evolution of phosphorus; in the presence of silica the liberation of phosphorus is almost quantitative. Aluminum forms several different compounds with phosphorus, Al_7P_3, Al_5P_3, Al_3P and AlP, all of which are decomposed by water with evolution of phosphin, PH_3. Carbon dioxid, carbon monoxid and carbonates are decomposed by aluminum with liberation of free carbon. Metallic oxids are decomposed giving the metal; sulfates, giving sulfur and sulfids; chlorids, giving the metal. A mixture of aluminum powder and sodium peroxid moistened with water burns spontaneously with a brilliant light. There are many possibilities of the development of the use of aluminum powder along technical lines.

J. L. H.

SCIENTIFIC NOTES AND NEWS.

VASCO DA GAMA CELEBRATION.

THE festivities at Lisbon in commemoration of the discovery of India by Vasco da Gama began on May 15th. There were illuminations and fêtes both in the city and on the warships of various nations assembled in the harbor. The commemoration was also celebrated in Great Britain at a meeting of the Geographical Society on May 15th, at which addresses were made by the Prince of Wales, Lord George Hamilton, the Portuguese ambassador and by the President of the Society, Sir Clements Markham, who read a paper on 'Vasco da Gama,' in the course of which he said, according to the report in the London *Times*, that they were assembled to commemorate one of the

greatest events in the history of the world—the discovery of the ocean route to India by the Portuguese. Vasco da Gama completed the mighty enterprise on the day when the ghâts of India were sighted from the deck of his ship just 400 years ago. The credit of this discovery was due to the Portuguese people, to their constancy and heroic perseverance, even more than to the skill and ability of their leaders, and he thought that many of the illustrious navigators of Portugal were equal in merit and should be equal in renown. They contemplated the perseverance of this people and the continuity of their work during a century and a half of mighty effort rather than a single stroke of genius. Yet it was right that Vasco da Gama, who forged the last link, should have the first place which Camoens has assigned to him, *primus inter pares*. Prince Henry the Navigator gave the first impetus. At his death the work was continued, with almost equal zeal, by the Kings—his nephews—Alfonso the African, Joaö the Perfect Prince, Manoel the Fortunate. The Da Gamas came of an ancient, valiant and loyal house, their ancestors having fought by the side of Alfonso III. in the conquest of Algarve from the Moors and by the side of Alfonso V., 'the Brave,' at the battle of Salado. Estevan da Gama, their father, was chief magistrate of Sines, and here Vasco da Gama was selected by King Manoel to command his famous expedition when he was 28 years of age. His eldest brother, Paulo was equally fitted for the post, and he insisted upon accompanying and serving under Vasco, in command of the second ship. They both looked upon Nicholas Coelho, who was captain of a third ship, the Berrio, as their brother. The expedition sailed on Saturday, July 8, 1497; there were about 160 souls all told. The fleet was accompanied by the great navigator Bartholomew Diaz as far as the Cape Verde Islands. He was going out in a fast caraval to take up his command of the new Portuguese settlement of Lamina, on the coast of Guinea. In December the expedition reached Rio do Infante, the farthest point of Bartholomew Diaz, on the eastern side of Africa, and entered upon new ground. There was a mutiny at this critical time. The men feared to proceed farther, and wanted to return, according to Correa, who added that Vasco da Gama put the master and pilot in irons for giving the same advice and threw all their instruments overboard. His brother Paulo induced his crew to obey orders by argument and persuasions and interceded for Vasco's prisoners. The first experience of the explorers on entering the previously unknown ocean was the force of the current, so strong that they feared it might frustrate their plans, until a fresh stern wind sprang up, which enabled them to overcome it. This Agulhas current was first scientifically investigated by Major Rennell in 1777. Vasco da Gama passed the coast which was named by him 'Natal,' on Christmas Day, and was well received by the natives of Delagoa Bay. He was at Quilimane in January, 1498, at Mozambique in March, and he reached Melinde on April 15th. There was a terrible outbreak of scurvy off Mozambique and again on the way home, and then it was that Paulo da Gama proved the guardian spirit of the expedition, giving up all his own private stores for the use of the sick, ministering to them, and warding off despondency by his words of encouragement and by his example. The King of Melinde supplied the Portuguese with an Indian pilot, a native of Gujarat, and on April 24th the voyage was commenced across the Indian Ocean from the east coast of Africa to Malabar. A voyage of 23 days brought the adventurous discoverers in sight of the mountains above Malabar. And thus was the Portuguese empire in India founded by two of Portugal's noblest sons, Vasco and Paulo da Gama. On March 20, 1499, they cleared the Cape, and returned to Lisbon on September 18th. But Paulo da Gama had died at Terceira, in the Azores.

GENERAL.

Sir J. Wolfe Barry and Professor Roberts-Austen, who are members of the committee appointed by the British government to report on the advisability of establishing a national physical laboratory in England have visited the Reichsanstalt and other technical institutions.

At the anniversary meeting of the Linnæan Society, London, on May 24th, a special gold medal was presented to Sir Joseph Hooker on

the occasion of the completion of his monumental work, 'The Flora of British India.' The annual gold medal of the Society was, in accordance with the arrangements already announced, presented to Major G. C. Wollich.

THE University of California has conferred the degree of LL. D. on Professor J. M. Schaeberle in recognition of his services to the Lick Observatory.

THE Gilbert Medal of the Society of Arts for the present year has been awarded to Professor R. W. Bunsen, of Heidelberg, the eminent chemist.

SIR WILLIAM H. FLOWER, Director of the British Museum of Natural History, has received from the German Emperor the Royal Prussian Order *Pour le Mérite* in the Division of Science and Art.

DR. ANTON DOHRN, Director of the Zoological Station at Naples, has been elected an honorary member of the Stockholm Academy of Sciences.

DR. GUMLICH and Dr. Holborn have been appointed professors in the Reichsanstalt at Charlottenburg.

M. FALGUIÈRE has now completed the monument of Pasteur to be erected in Paris, opposite the Pantheon. The international subscription for the monument amounts to about $80,000.

A PORTRAIT of Dr. James W. McLane, Dean of the College of Physicians and Surgeons, Columbia University, has been presented to that University by the faculty of the College on the occasion of the retirement of Dr. McLane from the chair of obstetrics after a service of 25 years.

PROFESSOR FRIEDRICH MÜLLER, of the University of Vienna, the eminent ethnologist and philologist, died on May 25th. He was born at Jemnik, in Bohemia, in 1834.

THE death is also announced of Mr. W. M. Maskell, Register of the University of New Zealand, who had made valuable contributions to entomology.

THE trustees of the Fiske fund, Providence, R. I., have awarded the Fiske prize of $350 to Dr. D. I. Wolfstein, of the Ohio Medical College, for an essay on 'The Neuron Theory; its Relation to Brain and Nerve Diseases in the Light of the Most Recent Investigations.'

THE College of Physicians of Philadelphia announces through its committee that the sum of $500 will be awarded to the author of the best essay in competition for the first Nathan Lewis Hatfield prize for original research in medicine. The subject is 'A Pathological and Clinical Study of the Thymus Gland and its Relations,' and essays must be submitted on or before January 1, 1900.

THE examination for the position of Photographer in the U. S. Naval Observatory (salary, $1,200 per annum) has been postponed to June 23d. The examination will consist almost exclusively of experience and practical questions in photography.

DR. FRANK WALDO, of Princeton, New Jersey, offers elementary or advanced courses of lectures on meteorology to colleges and other educational institutions. Persons interested in the matter can obtain further details at the above address. Dr. Waldo was formerly a junior professor in the U. S. Signal service, and is the author of 'Modern Meteorology' in the Contemporary Science Series (London), and of 'Elementary Meteorology,' recently published by the American Book Company, in New York.

IT is reported in the daily press that President Jordan, of Stanford University, and a party of men of science are at present engaged in exploring the Grand Cañon of the Colorado and the 'Enchanted Mesa.'

MR. NIKOLAI HANSEN, a Norwegian zoologist, will accompany Mr. Borchgrevink in his approaching expedition to South Victoria Land.

IN addition to Lieutenant Peary's expedition to the Pole by way of North Greenland and Mr. Walter Wellman's by way of Franz Josef Land, the steamship Helgoland has just started from Germany for the Far North. The leader of this expedition, Herr Theodor Lerner, is accompanied by Dr. Brühl, Dr. Römer and Dr. Schaudien.

REUTER'S agency announces that Baron Toll, the well-known Arctic explorer, has submitted to the Imperial Russian Geographical Society a scheme for an expedition to explore Sannikoff Land, about which very little is known and the very existence of which is denied by some explorers. These include Dr. Nansen, who de-

clares that he failed to find traces of any land north of the New Siberian Islands. Baron Toll, however, is convinced that Sannikoff Land will be found in the place where it is indicated on the maps, and purposes to go thither with dogs and sledges and a portable house, and spend a year in exploration.

The Massachusetts House of Representatives has rejected, by a large majority, the bill reported by the Committee on Education appropriating $2,500 for the Boston Meeting of the American Association for the Advancement of Science.

The Thirty-third Field Meeting of the Appalachian Mountain Club will be held in the Adirondacks, beginning Friday, July 1st. A week will be spent at St. Hubert's Inn, after which those who desire to do so will have an opportunity to visit Lake Placid and other attractive resorts in this beautiful group of mountains. During the Field Meeting two evenings will be devoted to scientific and literary matters, and papers descriptive of the topography, geology, natural history and forestry of the region will be presented by authorities on these subjects.

The annual meeting and *conversazione* of the Selborne Society took place on May 30th in the rooms of the Society, Hanover-square, the President, Sir J. Lubbock, M.P., being in the chair. The objects of the Society are to preserve from unnecessary destruction such wild birds, animals and plants as are harmless, beautiful and rare ; to discourage the wearing and use for ornament of birds and their plumage, except when the birds are killed for food or reared for their plumage; to protect places and objects of antiquarian interest or natural beauty from ill-treatment or destruction, and to promote the study of natural history.

Natural Science finds that, under its new Curator, Mr. Alexander Gray, the Robertson Museum at the Millport Marine Biological Station continues to prove of service to naturalists and of interest to the public. Dr. Gemmill, lecturer on embryology, and Dr. Rankin, demonstrator in zoology, in Glasgow University, took several of their students to Millport during the Easter vacation ; and it is expected that many students from Glasgow University, as well as those attending other science classes in the neighborhood, will avail themselves, during the coming season, of the advantages offered by this institution for gaining a practical knowledge of the subject of their studies not otherwise attainable.

The Boston *Transcript* states that several interesting changes and additions are being made in the collections in the Mineralogical Museum and Laboratory at Harvard. The most important change in progress is the work of arranging some five hundred geological specimens, taken from different parts of the Museum and representing a large number of formations, so as to illustrate in detail the physical properties of minerals and also their mode of occurrence and associations with one another. The work is in charge of Messrs. Arthur S. Eakle and Charles Palache, instructors in the geological department. The collection will be contained in a series of twelve cases in the gallery near the entrance, and will form one of the most interesting features of the Museum. There is also to be placed on exhibition a large special collection of minerals to illustrate the occurrence of volcanic bombs. This collection was made by Dr. L. L. Hubbard, State Geologist of Michigan, in the vicinity of Lake Laach, Germany, and was presented by him to the Museum. Still another new feature of the Museum will be a collection of specimens of calcite from Lake Superior. The specimens contain some exceptionally fine crystals and illustrate to good advantage the occurrence of calcite crystallizing with copper.

The 23d meeting of the American Library Association will be held at Lakewood at Chautauqua, N. Y, from the 4th to the 9th of July. An interesting program will be presented, including an address by Mr. Herbert Putnam, of the Boston Public Library, President of the Society.

The New York Free Circulating Library opened its tenth branch at 215 East 34th street, on Monday last, June 6th. The library occupies the three upper floors of a former private residence that has been altered to suit its pur-

poses. On the main floor is a well-selected library of about 4,000 volumes, which is operated on the open-shelf system. In the rear are reading tables, and on the second floor is a small reference library and a reading room furnished with newspapers and magazines.

AMONG the books recently sold from the Ashburnham library was a copy of Pliny's 'Historia Naturalis,' lib. xxxvii., printed upon vellum by Jenson at Venice in 1472, for £190.

THE Macmillan Company announce the early publication of a book on 'Animal Intelligence' by Professor Wesley Mills, of McGill University. Dr. F. S. Hoffman, professor of philosophy in Union College, has in the press of Messrs. G. P. Putnam's Sons a work entitled 'The Sphere of Science.'

A RAILWAY to extend entirely across Northern Sweden and Norway from the north end of the Gulf of Finland, northwest to Ofoten, on the Atlantic about 120 miles north of the Arctic circle, is proposed. The line will be about 300 miles long, and will, it is said, be farther north than any part of the new railroad to Archangel.

AT the meeting of the Institute of Civil Engineers on April 5th, Mr. A. H. Preece gave an account of the present state of electricity supply in London. According to an abstract in *Nature*, Mr. Preece said that there are now in London eleven important companies and five vestries supplying electricity, and three other companies and three vestries are taking steps to start works. Five companies and three vestries supply the alternating current, and the remainder use direct-current systems. The direct-current systems are divisible into two classes—the high-pressure and the low-pressure. In the former rotary transformers are used to reduce the high pressure to a low pressure, while the latter produces and distributes electricity at the same pressure at which it is supplied to consumers. The direct-current systems are applicable to compact areas, and, with the use of high pressure, to scattered or isolated compact areas. The chief advantages of the direct-current system are the possibility of using storage-batteries, which can not be employed with the alternating-current systems, greater efficiency in distribution and greater adaptability to motive power. The favorite methods of distributing electricity are to transmit current at a high pressure in heavily-insulated cables in iron pipes, and current at a low pressure in insulated cable in stoneware conduits, or in cables heavily armoured and laid direct in the ground. Rubber is now little used; paper and jute, impregnated with insulating compounds, having been extensively adopted. The electric-supply industry is rapidly growing, and no less than 40,000 h.p. is now being installed in London in order to meet the demand for electricity in the immediate future.

FROM a statement compiled by Statistician Parker, of the United States Geological Survey, it is shown that the total output of coal in the United States in 1897 amounted approximately to 198,250,000 short tons, with an aggregate value of $198,100,000, a fraction less than $1 a ton. Compared with 1896, this shows an increase in tonnage of 6,270,000 tons. The increase in the value of the product was only $1,700,000. The amount of coal produced in 1897 was the largest on record. The average value a ton was the lowest ever known, continuing the declining tendency which has been shown without any reaction.

VOLUME VI. of *Mineral Industry*, now in press, will show that the total value of the mineral production of the United States in 1897 was $746,230,982 (or, excluding duplication, $678,966,644), against $737,958,761 in 1896. The values given are generally at the mines or works; but with a few of the principal metals, such as lead, copper or zinc, this is not possible, and their values are taken at the leading markets. The total value of the output in 1896 exceeded that of the mineral and metal production of all Continental Europe, and nearly doubled that of the United Kingdom, the value of whose mineral output in 1896 was, in round figures, about $340,000,000, while that of Germany was about $300,000,000, that of France about $110,000,000, and that of Belgium $100,000,000.

UNIVERSITY AND EDUCATIONAL NEWS.

MR. PHILIP D. ARMOUR has given an additional endowment fund of $500,000 to the Ar-